DoD Extends Technological, Operational Edge Into the Future

DOD NEWS FEATURES, DEFENSE MEDIA ACTIVITY (DEC. 14, 2015)
Cheryl Pellerin

WASHINGTON—The Defense Department's civilian and military leadership is pursuing a significant and enduring effort to extend its military, technological, and operational edge well into the future, Deputy Defense Secretary Bob Work said today.

In a speech at the Center for a New American Security's National Security Forum, Work noted that this push into the future is driven by a pressing need to modify the defense program to meet evolving threats in the national security environment.

The effort includes new approaches to evaluating and offsetting the conventional strengths of potential adversaries, a commitment to U.S. allies and friends, and a drive to innovate.

The Only Great Power

During the period between 1999 and 2014, Work said, the United States was the world's only great power and the sole military superpower.

"This gave us enormous freedom of action, but the circumstance is changing," he said. "The unipolar world is starting to fade and we have a more multipolar world in which U.S. global leadership is likely to be increasingly challenged."

For the United States, Work added, "the most stressing [challenge] is the reemergence of great power competition." For the purposes of building a defense program focused on the capabilities of potential adversaries, the deputy secretary said he uses international relations theorist John Mearsheimer's definition of a great power—a state having sufficient military assets to put up a serious fight in an all-out conventional war against the dominant power, and possessing a nuclear deterrent that could survive a first strike against it.

On Their Way

By that narrow definition, Work said, "[and] from a defense program perspective, if Russia and China are not yet great powers, they're well on their way.

"We've been trying for 25 years to include Russia within the European community and we want to partner with it on a wide variety of global issues," Work said, adding that the United States still seeks both outcomes.

Deputy Defense Secretary Bob Work speaks at the Center for a New American Security in Washington, D.C., Dec. 14, 2015.
DoD photo by Petty Officer 1st Class Tim D. Godbee

But Russia, he explained, is modernizing its nuclear and conventional forces, sharpening its warfighting doctrine aimed at NATO, rattling its nuclear saber, seeking to undermine NATO and intimidate the Baltic States, and trying to rewrite the international rule book.

As a result, the department is adapting its operational posture, contingency plans, and programs to deter further aggression, the deputy secretary said.

The Bottom Line

"China, a rising power with impressive latent military technological capabilities, probably embodies a more enduring strategic challenge as its ambitions and objectives expand in Asia, [the] Western Pacific, littoral Africa, Latin America, and elsewhere," Work said.

China's words have been about peaceful rise and about defense, he added, but its actions will be the true test of its commitment to peace and stability in the current international order.

The department continues to pursue military-to-military cooperation and a wide range of confidence-building measures with China "to make sure we never come to blows, but ... we can't overlook the competitive aspects of our relationship, especially in the realm of military capabilities. And that's the bottom line," Work said.

A Focus on Capabilities

DoD focuses on the capabilities of potential challengers, and Russia and China present the United States and its allies and partners with unique and increasingly stressing military capabilities and operational challenges, the deputy secretary said.

The department understands the importance of engaging with potential competitors, but it does so cognizant of its central purpose "to reassure our allies and partners ... and to protect U.S. forces and our allies from direct attack," he added, "and, should deterrence fail, make sure that we are able to roll back any aggression that occurs."

The best way to prevent great-power competition from becoming great-power conflict, the deputy secretary said, is for the United States to maintain a safe, reliable, and secure nuclear arsenal for so long as those weapons exist, coupled with strong conventional deterrent capabilities.

Offset Strategies

The United States has historically strengthened its conventional deterrence by pursuing a combination of superior technological capabilities and innovative operational and organizational constructs that offset the strengths of its potential adversaries, Work noted.

In the 1950s, the first offset strategy sought to blunt Soviet numerical and geographical advantage along the inner German border by introducing, demonstrating, and developing the operational and organizational constructs to use battlefield nuclear weapons, he said.

After the Soviets achieved strategic nuclear parity in the 1970s, the second offset strategy included precision-guided munitions with near-zero miss.

Today, the department is pursuing a third offset strategy that includes the following five kinds of technological advances:

1. Learning systems
2. Human-machine collaboration
3. Human-machine combat teaming
4. Assisted human operations
5. Network-enabled, cyber-hardened weapons

Deterrent Posture

Work said the first priority in trying to build a strong deterrent posture is "to try to achieve a technological overmatch against potential adversaries."

The department needs new technological capabilities to try to achieve the technological overmatch important to an offset strategy, the deputy secretary said, but "you need new organizational and operational constructs to make them real and to gain operational advantage."

Such capabilities also must be demonstrated, Work added, so an adversary can see that any attempt to achieve operational success in the warfighting campaign is likely to fail, even if they were to achieve an initial advantage in time and space.

AFRL Develops Integrated Weapons Analysis Capability to Meet Warfighter Needs

AIR FORCE RESEARCH LABORATORY (DEC. 23, 2015)
Jeanne Dailey

KIRTLAND AIR FORCE BASE, N.M.—The Air Force Research Laboratory commander, Maj. Gen. Thomas Masiello, wants an integrated analysis capability and common framework that allows understanding the effectiveness of directed energy and kinetic weapons, whether used separately, cooperatively, or synergistically.

To meet this need, AFRL created the Integrated Weapons Environment for Analysis, or IWEA, which brings together

for the first time analysis tools that are used to evaluate the effectiveness and military utility of potential weapons technologies into a common analysis environment. Before IWEA, the military utility attributed to a particular weapon technology was assessed individually with varying degrees of fidelity.

"Bringing the tools together in a common analysis environment increases the overall fidelity and allows analysts to consider the synergistic benefit of combining different technologies like kinetic and directed energy weapons," Masiello said. "IWEA provides a comprehensive weapons strategy to better meet warfighter needs."

The IWEA project began in 2012 as a multi-directorate project under the AFRL Commander's Research and Development Fund with researchers from the Aerospace Systems, Directed Energy, Human Effectiveness, Munitions, and Sensors Directorates supporting development. AFRL's chief technologist Dr. Morley Stone highlighted IWEA as a "shining example of AFRL cross-directorate collaboration."

Masiello designated the Directed Energy Directorate as the lead directorate with Linda Lamberson as program manager responsible for leading integration of the directed energy analysis tools into the IWEA environment.

Capt. Melanie Walton, the deputy program manager from the Munitions Directorate, was responsible for leveraging and enhancing existing kinetic weapon analysis tools and for providing the Endgame Framework software that was used to integrate all of the lethality tools together. IWEA is also now using the Analytical Framework for Simulation, Integration, and Modeling for all mission-level simulation requirements.

Leveraging from research in autonomy, the Aerospace Systems team provided novel aircraft/weapons employment optimization tools to rapidly and efficiently explore the best combination of weapons and weapons load-outs for specific mission areas. Human Effectiveness provided tools to evaluate collateral personnel hazards from directed energy employment. Sensors provided the interface to their high-fidelity sensing data analysis toolset.

"AFRL envisions many uses for the IWEA environment," Lamberson said. "AFRL technologists can use IWEA to identify specific design requirements that will support research and inform technology investment decisions, ultimately resulting in capabilities that better meet our warfighter needs. Also, analysts from AFRL or other Air Force and Department of Defense agencies can use IWEA to generate weapon effectiveness data for use in military utility studies designed to evaluate alternatives to meet specific mission needs."

Logo image courtesy AFRL

Modeling and simulation is a critical component of AFRL's support to Air Force development planning, Masiello said.

"AFRL is leading the way for the Air Force in new modeling and simulation paradigms, which includes IWEA. The integration of IWEA with our AFSIM modeling program will be a powerful combination of AFRL M&S tools directly supporting development of national defense capabilities."

The Integrated Weapons Environment for Analysis brings together analysis tools that are used to evaluate the effectiveness and military utility of potential weapons technologies into a common analysis environment.

Tern Moves Closer to Full-Scale Demonstration of Unmanned VTOL Aircraft Designed for Small Ships

With Phase 3 award, program aims to deliver embedded capabilities that have been on the U.S. Navy's wish list since World War II.

DEFENSE ADVANCED RESEARCH PROJECTS AGENCY OUTREACH (DEC. 28, 2015)

Small-deck ships such as destroyers and frigates could greatly increase their effectiveness if they had their own unmanned air systems (UAS) to provide intelligence, surveillance and reconnaissance (ISR) and other capabilities at

DARPA has awarded Phase 3 of Tern to a team led by the Northrop Grumman Corporation. DARPA plans to build a full-scale demonstrator system of a medium-altitude, long-endurance unmanned air system (UAS) designed to use forward-deployed small ships as mobile launch and recovery sites.

Image courtesy DARPA

long range around the clock. Current state-of-the-art UASs, however, lack the ability to take off and land from confined spaces in rough seas and achieve efficient long-duration flight. Tern, a joint program between DARPA and the U.S. Navy's Office of Naval Research (ONR), seeks to provide these and other previously unattainable capabilities. As part of Tern's ongoing progress toward that goal, DARPA has awarded Phase 3 of Tern to a team led by the Northrop Grumman Corporation.

The first two phases of Tern successfully focused on preliminary design and risk reduction. In Phase 3, DARPA plans to build a full-scale demonstrator system of a medium-altitude, long-endurance UAS designed to use forward-deployed small ships as mobile launch and recovery sites. Initial ground-based testing, if successful, would lead to an at-sea demonstration of takeoff, transition to and from horizontal flight, and landing—all from a test platform with a deck size similar to that of a destroyer or other small surface-combat vessel.

"The design we have in mind for the Tern demonstrator could greatly increase the effectiveness of any host ship by augmenting awareness, reach, and connectivity," said Dan Patt, DARPA program manager. "We continue to make progress toward our goal to develop breakthrough technologies that would enable persistent ISR and strike capabilities almost anywhere in the world at a fraction of current deployment costs, time, and effort."

"ONR's and DARPA's partnership on Tern continues to make rapid progress toward creating a new class of unmanned air system combining shipboard takeoff and landing capabilities, enhanced speed and endurance, and sophisticated supervised autonomy," said Gil Graff, deputy program manager for Tern at ONR. "If successful, Tern could open up exciting future capabilities for Navy small-deck surface combatants and U.S. Marine Corps air expeditionary operations."

"Through Tern, we seek to develop and demonstrate key capabilities for enabling distributed, disaggregated U.S. naval architectures in the future," said Bradford Tousley, director of DARPA's Tactical Technology Office (TTO), which oversees Tern. "This joint DARPA-Navy effort is yet another example of how the agency collaborates with intended transition partners to create potentially revolutionary capabilities for national security."

The Tern Phase 3 design envisions a tailsitting, flying-wing aircraft with twin counter-rotating, nose-mounted propel-

lers. The propellers would lift the aircraft from a ship deck, orient it for horizontal flight and provide propulsion to complete a mission. They would then reorient the craft upon its return and lower it to the ship deck. The system would fit securely inside the ship when not in use.

Tern's potentially groundbreaking capabilities have been on the Navy's wish list in one form or another since World War II. The production of the first practical helicopters in 1942 helped the U.S. military realize the potential value of embedded vertical takeoff and landing (VTOL) aircraft to protect fleets and reduce the reliance on aircraft carriers and land bases.

The Tern demonstrator will bear some resemblance to the Convair XFY-1 Pogo, an experimental ship-based VTOL fighter designed by the Navy in the 1950s to provide air support for fleets. Despite numerous successful demonstrations, the XFY-1 never advanced beyond the prototype stage, in part because the Navy at the time was focusing on faster jet aircraft and determined that pilots would have needed too much training to land on moving ships in rough seas.

"Moving to an unmanned platform, refocusing the mission, and incorporating modern precision relative navigation and other technologies removes many of the challenges the XFY-1 and other prior efforts faced in developing aircraft based from small ships," Patt said. "Tern is a great example of how new technologies and innovative thinking can bring long-sought capabilities within reach."

DARPA and the Navy have a Memorandum of Agreement (MOA) to share responsibility for the development and testing of the Tern demonstrator system. The Marine Corps Warfighting Laboratory (MCWL) has also expressed interest in Tern's potential capabilities and is providing support to the program.

2015 Marks Science, Technology Breakthroughs

ARMY NEWS SERVICE (DEC. 29, 2015)
Compiled by David Vergun

WASHINGTON—In 2015, the U.S. Army's homepage published dozens of stories regarding technology being developed by engineers and scientists across the force. Among the topics of interest were developments in power distribution, robotics, and network security software.

The editors at Army News Service delved into an array of science and technology reporting from 2015, and pulled just a few topics to highlight here.

Getting off the Grid

A big vulnerability to soldiers on installations around the world is dependence on the public electrical grid, said Katherine Hammack, who serves as assistant secretary of the Army for installations, energy and environment.

Hammack spoke earlier this month during an energy panel in Washington, D.C., Dec. 3.

Instead of depending on municipal power, the Army would instead like to generate its own power, and manage that with "smart microgrids" she said. Such grids prioritize and manage power loads, moving energy around to where it's needed most. The grids would also use renewable energy like solar, wind, or hydro-electric.

One such smart microgrid, the Army's largest, is located on Fort Drum, New York, where a coal-fired power plant was converted to produce energy from biomass, she said. That plant now supplies power to the installation and the local community. Excess energy produced there can also be transferred back to the local power company.

In mid-November, the Army wanted to test what would happen if there was a disruption to the main power grid on Fort Drum. Disconnecting the installation from the local power utility ultimately proved the installation could survive under its own power, meaning the test was a success, Hammack said.

Another example of a smart microgrid, Hammack said, is one that's solar-powered on Fort Hunter-Liggett, California. It serves five buildings now, but there are plans for expansion across the post.

On Fort Carson, Colorado, the Army has partnered with Sandia National Laboratories to provide a solar-powered microgrid and vehicle-to-grid storage. That program, she said, goes by the name Smart Power Infrastructure Demonstration for Energy Reliability and Security, or SPIDERS.

The vehicle-to-grid approach uses Fort Carson's government vehicles as microgrid energy storage devices, she said. When the vehicles are parked, they receive electrical power from the microgrid. If they have excess power, they return it to the microgrid.

When the vehicles are being used, the vehicles themselves provide power to soldiers who, for example, might be running electric power tools or compressors, she said. This alleviates the need for towing petroleum-fed generators around.

Evaluating Network Effectiveness
Nothing is more important than for soldiers to be able to communicate with each other and allies on the battlefield. The Network Integration Evaluation, or NIE 16.1, took place Sept. 25 through Oct. 8, and evaluated that capability. The exercise was the largest NIE ever since the exercises started in 2011, said Brig. Gen. Terry McKenrick.

Normally, there are between 3,500 and 3,800 participants in NIE, said McKenrick, the commander of Brigade Modernization Command. NIE 16.1 had more than 9,000 U.S. and coalition troops, supported by more than 3,000 civilians, participating primarily on Fort Bliss, Texas, but also from other locations around the United States and the world.

NIE 16.1 assessed manned/unmanned teaming, which involves the seamless pairing of a pilot who sits in a helicopter, for instance, with one or more unmanned aerial vehicles that are flying in other locations. This capability increases situational understanding, lethality, and sustainment of maneuver forces while reducing manpower and risk, McKenrick said. In all, three unmanned ground systems were evaluated, as well as several networked unmanned air systems.

Networks provide the ability for soldiers in command posts, mounted and dismounted, to download situational awareness data from unmanned air systems.

In another development, McKenrick said the Army is now going through an "assessment process" of accrediting White Sands-Bliss-Holloman as a "joint-multinational training capability. That will help us bring in more joint and multinational partners in future exercises."

Now and in the future, McKenrick said, the Army will operate as part of a joint and coalition force. That idea is not unique to NIE, but is in fact spelled out in the Army's keystone doctrine known as the "Army Operating Concept: Win in a Complex World," also known as the AOC.

To achieve the aim of the AOC effectively requires compatibility across network architectures of all involved, he said. That's why exercises such as the NIE are so important to the United States and its partner nations.

Age of the Robots
The age of Army ground robots will soon be here, said Scott Davis, program executive officer for Combat Support and Combat Service Support, back in April. "Established and emerging robotics programs of record will be fielded in the 2019 to 2024" timeframe, he said.

The robotic systems under consideration include autonomous and semi-autonomous systems used to clear mines, provide surveillance, move supplies, and acquire targets, among many other things.

Ground-based, semi-autonomous systems such as those that performed mine-clearing operations proliferated during the last decade of war. But Davis said those systems are often nonstandard, and are built with non-interchangeable parts. Additionally, many of them have not made the transition into programs of record, he said. They were hurriedly built for the immediate need to save soldiers' lives.

Today, these disparate systems have become a "sustainment burden" to the Army, since they are not built into a program of record, he said, and were acquired through overseas contingency operations funding.

Davis is responsible for executive management of development, systems integration, acquisition, testing, fielding, sustainment, and improvement of some 350 diverse combat support and combat service support systems. He, along with soldiers involved in testing, will help sort through what robotic platforms will be used going forward and what will be riding on them.

Robotics technology evolves rapidly, Davis said. But the standard requirements and acquisition process is three to seven years. Under that schedule, odds are that a system that could serve the Army now might become obsolete before fielding or even before it reaches initial operational capability.

The Robotics Enhancement Program, or REP, should alleviate this concern, Davis said. The concept is similar to that of the Soldier Enhancement Program, which is not a full acquisition life-cycle program. REP was unveiled in May.

Excalibur Unleashed
In October, the Army introduced its newest supercomputer, Excalibur, which will help ensure soldiers have the technological advantage on the battlefield, officials said.

Excalibur is the 19th most powerful computer in the world. It's located at the U.S. Army Research Laboratory, Department of Defense Supercomputing Resource Center at Aberdeen Proving Ground, Maryland.

Increased computational capabilities will allow researchers to bring improved communications, data, and intelligence to soldiers in the field, said Maj. Gen. John F. Wharton, commander of the U.S. Army Research, Development and

In many remote areas where soldiers operate, their over-the-horizon radio communication from the field to higher headquarters like the brigade is nonexistent. Army scientists and researchers built the SMDC-ONE nanosatellite as an innovative technology solution. The ONE stands for Orbital Nanosatellite Effect.
U.S. Army graphic image

Engineering Command. "The Army Operating Concept discusses innovation and accelerating the speed of technology. The Excalibur will allow us to do that," he said, adding that Excalibur provides "decisive overmatch for our Army."

Wharton said when tied to the tactical network, Excalibur will be able to provide data instantly to the field.

Plan X Revealed

"Do you have a map in your car? When was the last time you looked at a compass? Imagine a day when we don't have that technology such as the Global Positioning System, better known as GPS. These are the things we worry about," Capt. James McColl said.

Both McColl and Capt. Justin Lanahan are cyber officers, part of the newly created 17-series Army branch. Both Army officers participated in a week-long "hackathon," July 20-24, in support of continued development of "Plan X," a four-year, $120-million program at the Defense Advanced Research Projects Agency, or DARPA.

Plan X attempts to, among other things, make it easier for humans to visualize a network and its components, to automate the task of identifying as hostile or benign the anomalies that might appear on that network, to provide intuitive symbology that accurately conveys to users the status of various components of a network, and to make it easier for even inexperienced users to take action to prevent hostile parties from gaining access to and causing damage to a network.

Any part of a commander's command and control network might include thousands of computers and networking components. The complexity of such networks makes them hard for humans to visualize, and difficult to defend. Plan X is meant to make that task easier.

Adversaries are always looking for ways to exploit networks for their own benefit, McColl said. And that doesn't always mean they use it for their own purpose, or that they want to steal information from it. They might also attack a network simply to disrupt its functionality and deny its use to those who own it.

The work done at the hackathon was meant to enhance the ability of Plan X to automatically identify threats to the network. During the course of the event, involved teams would periodically insert new code and algorithms into the system to see how they performed, Lanahan said.

Ideally, when a threat is identified, users of Plan X wouldn't need to be computer scientists or hackers themselves to defeat it. Instead, pre-written software tools that would be part of Plan X would allow users to drag their fingers over a threat to apply a software solution that could block an intrusion or defeat an infection.

With Plan X, it will be easier for operational commanders to understand the network in the same way they might understand the physical world around them, said Ian MacLeod, technical director of Army Cyber Command's Advanced Concepts and Technologies Directorate.

Lab Collaboration Boosted

Software engineers at the U.S. Army Armament Research, Development and Engineering Center, or ARDEC, in Picatinny Arsenal, New Jersey, developed a new mobile application that allows users to learn more about the many laboratories across the Department of Defense. The application was announced in October.

The Defense Laboratory Enterprise eSmartbook application, which is open to the public and available on both Apple and Android devices, was designed and developed in-house at the ARDEC Armament Software Engineering Center, or SEC, through coordination with the Assistant Secretary of Defense (Research and Engineering) Defense Laboratory Office.

The app provides users facts and media about each laboratory, as well as an RSS news feed that pulls science and technology articles from across the Defense Laboratory Enterprise. The app improves upon information previously provided in hard copy format, or as static documents available online.

"We approached the Defense Laboratory Office and suggested [the creation of] a mobile application. It can be updated over the air and bring in news stories from news feeds across the DoD," said Dr. Bernard Reger, associate for business planning and development for the Armament SEC.

Labs can quickly update information when changes occur in their organizations, an advantage of the app over traditional print publications.

"Giving out information that's five years old can be dangerous in some cases and just not useful," Reger said. "The eSmartbook is more efficient, modern, and easily updated. As a partner to the app, we developed a web application for the labs to log in and update their data. As a lab grows into new research areas, that information will be available. The labs control the information and it is cleared for public release."

He said such information could also be beneficial for college students looking for a job, or even for government personnel looking to collaborate with other labs. Allies can use the app to foster collaboration, too.

Editor's note: This roundup was compiled from original reports by David Vergun, Todd Lopez, Dan Lafontaine, Audra Calloway, and Jason B. Cutshaw.

Pentagon Says F-35 Program on the Right Track

AIR FORCE NEWS SERVICE (DEC. 29, 2015)
Mitch Shaw

HILL AIR FORCE BASE, Utah—Lockheed Martin and the Pentagon's F-35 Joint Program Office say they've finished delivering jets for 2015, increasing their yield from last year by 25 percent.

Joe DellaVedova, a spokesman with the F-35 office at the Pentagon, said 45 F-35s were delivered, which met Lockheed and the program office's delivery goal for the year and exceeded last year's deliveries by nine jets.

"Meeting aircraft production goals is a critical stepping stone in demonstrating the program is ready for the expected significant production ramp up," Lt. Gen. Chris Bogdan, the F-35 program executive officer, said in a press release.

Lorraine Martin, Lockheed's F-35 program general manager, said the 2015 deliveries were "a clear demonstration of our growing maturity and stability."

The performance boost represents good news for Hill Air Force Base, which accepted its first two jets in September and will continue to count on a steady income of fighters until 2019 to fill three F-35 squadrons.

Base spokesman Rich Essary said it has received a total of five jets so far, with the next one scheduled to arrive in January. Essary said the plan is for Hill AFB to continue to accept jets at a rate of one or two each month until they receive their full allotment of 72.

The F-35 Lightning II makes its first appearance March 10, 2014, at Luke Air Force Base. The aircraft was flown in directly from the Lockheed Martin factory at Fort Worth, Texas, and is the first of 144 F-35s that will eventually be assigned to the base.
U.S. Air Force photo/Staff Sgt. Darlene Seltmann

By August 2016, the base hopes to have 15 jets in place in order to reach what the Air Force calls "initial operational capability," which means Hill AFB has met the minimum goal to use the jets for normal operations.

On Dec. 11, Maj. Jayson Rickard, a reservist with the 466th Fighter Squadron, flew the 100th F-35 sortie at Hill AFB since the first combat aircraft arrived in September.

Of the 45 jets delivered in 2015, the lion's share has gone to the Air Force, which has received 26 F-35As. The Marine Corps received eight F-35Bs and the Marines and the Navy each accepted four F-35Cs, which can take off and land vertically from aircraft carriers.

DellaVedova said 154 operational F-35s have been delivered to the Department of Defense and partner nations since the program's inception. The fleet has more than 45,000 flight hours. The multirole fighter will eventually replace the Air Force's entire fleet of F-16 Fighting Falcons and A-10 Thunderbolt IIs.

3D Printing to Enable Rapid On-Demand Manufacturing for Sailors

NAVY NEWS SERVICE (JAN. 14, 2016)
Luefras Robinson

DAHLGREN, Va.—From making prosthetics to prototyping a robot, 3D printing technologies are making concepts a rapid reality for today's warfighter, on demand.

The reality of 3D printing, also known as additive manufacturing, is expanding across the Navy's science and engineering community via Naval Surface Warfare Center Dahlgren Division (NSWCDD) and Combat Direction Systems Activity (CDSA) Dam Neck.

"We are on the ground floor of 3D printing," NSWCDD Technical Director Dennis McLaughlin told 100 participants at a 3D Print-A-Thon here in December when 3D printing experts revealed the technology's capabilities and design guidelines.

"We need to move past the trinket stage and come up with examples that senior leaders can see," said McLaughlin. "Let's come up with ideas for what else we can do."

DAHLGREN, Va. (Dec. 2, 2015) Kevin Streeff, an instrumentation engineer at Naval Surface Warfare Center, Dahlgren Division (NSWCDD), demonstrates how the 3D ScanArm scans objects and creates digital models for printing. A digital model of the scanned bust is shown on the computer screen during the command's December 2015 Print-A-Thon. The reality of 3D printing—also known as additive manufacturing—is expanding across the Navy's science and engineering community via Naval Surface Warfare Center Dahlgren Division (NSWCDD) and Combat Direction Systems Activity (CDSA) Dam Neck.
U.S. Navy photo by Luefras Robinson

Scientists and engineers, who were provided with the 3D printing tools to experiment at the event, responded with innovative ideas to benefit the warfighter, and the response is ongoing. They are using a 3D printing device that significantly reduces production time, allowing rapid deployment of equipment part replacements back to the field.

NSWCDD, the first warfare center with a metal 3D printer, displayed diverse 3D printer-created products at the event. For example, Print-A Thon attendees saw a replica of a warship's command center design console and a low-fidelity 3D model used to gather input on layouts from the fleet on both coasts.

Due to the portable, lightweight nature, the models are reused over an extended amount of time, significantly reducing hours required to create small scale mockups by hand. Being able to 3D print the components also save a considerable amount of labor as more durable models are produced.

Another example of rapid 3D development is the rapid prototype HexaPod Robot, which is in the early research and development phase. The robot could provide several advantages to the warfighter such as low-power movement through difficult terrain, considering its small, covert, low-profile heat signature. Engineers can transition a concept to full prototype in four weeks as compared to three to four months without 3D technology.

Just 12 hours before the event, engineers decided the robot was too heavy, so they quickly remanufactured the base and top, reducing the weight from 2.65 kilograms to 2.06 kilograms. This is reflective of the bright future 3D printing holds for the warfighter.

"The ability to move additive manufacturing into the field would allow for equipment to be made on demand, reducing the overall footprint on the ground and dramatically increasing flexibility," said Jason Phillips, an NSWCDD engineer in the Disruptive Technologies branch.

NSWCDD is also realizing the benefits of reproducing human anatomy thanks to 3D printing. Minimal effort is needed to fabricate complex human features such as a human head.

At the Print-A-Thon, Kevin Streeff, instrumentation engineer, demonstrated how a laser tracking camera would be used to define a head. In real-time as the head of a plastic bust was scanned, a digital version appeared on the computer screen to set the stage for printing. A whole body scan can be completed in less than two hours.

This far-reaching capability includes prosthetics design and manufacturing, cosmetic and corrective surgery design, custom fit masks, and face pieces based on scanning living anatomy. The scanning technology can also be used scan mechanical components for modeling, analysis, or re-engineering.

These innovations were among 10 featured at the Print-A-Thon. "We have a suite of varying 3D capabilities across

the base," said Ricky Moore, lead mechanical engineer for NSWCDD's Disruptive Technologies Branch. "We are developing lessons learned with regard to fabrication and design."

In his 2013 State of the Union Address, President Barack Obama called 3D printing a technology with the "potential to revolutionize the way we make almost everything." The Department of Defense has been a leader in utilizing 3D printing to save time and money. With origins dating back to the 1970s, 3D printing contrasts traditional manufacturing by adding, instead of subtracting, substances such as metals or plastics to create an object.

For almost a decade, NSWCDD has employed additive manufacturing to reduce development time, but the focus on solving fleet problems began in 2013 when CDSA Dam Neck—in conjunction with CNO's Rapid Innovation Cell—initiated the Navy's consolidated effort to bring 3D printing to fleet sailors.

The Navy's first-ever "Print-the-Fleet" was hosted by CDSA in June 2013 to raise fleet awareness of Additive Manufacturing and provide an understanding of how 3D printing can solve fleet problems. This two-day event also provided Navy Additive Manufacturing professionals first-hand feedback from sailors on what they would like to see printed.

For more news from NSWC Dahlgren, visit http://www.navy.mil/local/NSWCDD/.

Chief of Naval Research Helps Steer New Tech for the Fleet

OFFICE OF NAVAL RESEARCH PUBLIC AFFAIRS (JAN. 15, 2016)
Warren Duffie

ARLINGTON, Va.—On Jan. 13, Chief of Naval Research Rear Adm. Mat Winter gave the keynote address at the Surface Navy Association's 28th Annual National Symposium, held in Crystal City, Virginia.

When discussing the Navy's top science and technology (S&T) priorities with military, government, and industry leaders, Winter reflected on his college days at the University of Notre Dame.

"When I graduated from Notre Dame 30 years ago, many of the things that the Navy had in the 'petri dish' back then, so to speak, are being used today throughout the fleet," said Winter. "The big questions we ask daily at the Office of Naval Research [ONR] are 'What's in the petri dish now?' and 'How can we be better about developing tomorrow's technology for our sailors and Marines?'"

The symposium featured defense companies, suppliers, and military commands exhibiting surface warfare technology and future research and development initiatives.

The theme of this year's symposium was, "Surface Warfare Strategy: A View Beyond the Horizon." Keeping with that theme, Winter outlined ONR's mission; organizational structure and goals; and its investment portfolio, which ranges from quick-reaction projects that take as little as a year to implement within the fleet, to long-term research that could pay off big in 20 years.

"As the chief of naval research, I'm the chief mad scientist of the Navy," said Winter. "At ONR, we discover new and exciting knowledge every day. What keeps me up at night is how to get technology to the warfighter—and how to make the business and execution of science more effective and efficient."

Winter highlighted several ONR-sponsored technologies that are navigating the transition pipeline successfully, including:

- Ground-Based Air Defense Directed Energy On-the-Move program, commonly referred to as GBAD http://www.onr.navy.mil/Media-Center/Press-Releases/2014/Ground-Based-Air-Defense-Laser.aspx: GBAD is a laser weapon system powerful enough to shoot down enemy unmanned aerial vehicles and small enough to fit in the back of a Humvee or Joint Light Tactical Vehicle.
- LaWS http://www.onr.navy.mil/Media-Center/Press-Releases/2014/LaWS-shipboard-laser-uss-ponce.aspx: A shipboard laser weapon system currently aboard USS Ponce (AFSB[I] 15).
- Electromagnetic Railgun http://www.onr.navy.mil/Media-Center/Press-Releases/2015/Railgun-at-Future-Force-EXPO.aspx: This weapon generates high-powered electrical currents to launch projectiles at distances over 100 nautical miles at speeds that exceed Mach 6, or six times the speed of sound.

"We've also been able to develop and get out various quick-reaction technologies our sailors can use right away on ships," said Winter. "These include systems that fight corrosion as well as autonomous robotic tools for cleaning and repairing pipes. They're not sexy technologies, but they help our sailors perform their missions better and provide the Navy with significant savings."

Winter also discussed ONR's investment priorities for development of future technology. Among these were directed energy and electric weaponry; cyber dominance; electronic warfare; unmanned autonomous vehicles that can "swarm"

ARLINGTON, Va. (Jan. 13, 2016) Rear Adm. Mat Winter, chief of naval research, discusses game changing technology for the warfighter during a keynote address at the 28th annual Surface Navy Association (SNA) National Symposium. The Department of the Navy's Office of Naval Research provides the science and technology necessary to maintain the Navy and Marine Corps' technological advantage.
U.S. Navy photo by John F. Williams

adversaries; and synthetic biology, which creates new organisms with specific functions, such as threat monitoring.

Winter closed his remarks by inviting symposium attendees to check out ONR's website http://www.onr.navy.mil/ to learn about partnership opportunities. "Within the S&T community, the triad composed of government, industry, and academia is vital to success," he said. "With your help, we can develop and mature tomorrow's technology."

The Surface Navy Association was incorporated in 1985 to promote greater coordination and communication among those in the military, business, and academic communities who share a common interest in naval surface warfare, and to support the activities of Surface Naval Forces.

For more news from Office of Naval Research, visit http://www.navy.mil/local/onr/.

Acquisition Enterprise: Experimentation and Agility

SECRETARY OF THE AIR FORCE PUBLIC AFFAIRS COMMAND INFORMATION (JAN. 15, 2016)
Senior Airman Ashley Powell

WASHINGTON—A key leader in Air Force acquisition testified Jan. 7 on Capitol Hill before the House Armed Services Committee on acquisition reform, explaining how the Air Force is improving its acquisition processes through agility and experimentation.

Rich Lombardi, the acting assistant secretary of Air Force acquisition, discussed how the acquisition enterprise needs to focus on three areas to include strategic planning, prototyping, and experimentation; science and technology; as well as modular and open systems architecture.

"Over the past two years the Air Force has made great strides to improve the strategic planning process as evidenced by the release of the visionary 30-year strategy," Lombardi said. "We're also reinvigorating the use of prototype and experimentation for the purpose of providing warfighters

with the opportunity to explore novel operational concepts … reduce risk and lead times to develop and field advanced weapon systems."

Lombardi said the Air Force's science and technology program plays an integral role in technology development, often fielding temporary operational prototypes to meet urgent warfighter needs. However, they are not necessarily the final solution, but a stepping stone to a long-term solution that addresses aspects of producibility, reliability, and sustainability.

According to Lombardi, the Air Force developed a system in response to urgent warfighter needs received from the Combined Joint Special Operations Task Force in Afghanistan. The Air Force developed and deployed a sensor payload on a tactical remotely piloted air vehicle. This capability has been very successful in supporting numerous activities in theater and is credited with improvised explosive device detection, weapons cache identification, and enemies being captured or killed.

The use of modular and open systems architectures allows the Air Force to be more agile and adaptable, which is why there is an emphasis on fielding systems more rapidly and building resilient systems that are inherently resistant to predictive failure, according to written testimony.

"The Air Force has more programs than ever implementing modular and open system architecture approaches," Lombardi said. "These methods can help shorten developmental timelines. Such systems are designed to later upgrade, which can allow us to better manage our risk and schedule."

Lombardi also addressed business-related challenges by explaining Open Systems Acquisition, a new acquisition approach prototype.

"It will enable aggressive competition toward rapid prototyping and utilize other transaction authority to create a consortium specifically focused on reaching non-traditional defense companies," he said.

This model was tested last year as a pilot initiative for the Air Force Distributed Common Ground System, the Air Force's primary intelligence, surveillance, and reconnaissance collection, processing, exploitation, and analysis and dissemination system.

Two teams of developers were awarded contracts for their products that were offered at less than 80 percent of the original government cost estimate.

"I firmly believe the Air Force acquisition enterprise has and is building an even stronger engineering and program management culture that values strategic agility as a core capability," Lombardi said. "We look to capitalize on the complex and dynamic environment of today and tomorrow to ensure our airmen have what they need to meet any challenge or any threat, anywhere in the world."

Vice Chairman: Military, Nation Need Dialogue About New Technologies

DOD NEWS, DEFENSE MEDIA ACTIVITY (JAN. 21, 2016)
Jim Garamone

WASHINGTON—The military, the people of the United States, and the people of the world need to understand the profound impacts of technologies on the horizon today, the vice chairman of the Joint Chiefs of Staff said at the Brookings Institution here this morning.

Air Force Gen. Paul J. Selva told a packed room that the world will be facing the "Terminator Conundrum" sooner rather than later, and that now is the time to discuss the effects new technologies will have on the nation and on warfare. Michael O'Hanlon of Brookings moderated the talk.

"You and I are on the cusp of being able to own cars that will drive themselves," Selva said. "The technology exists today. Some of us in this room own cars that park themselves, and they do a substantially better job than we do."

Always a Human in the Loop

The military has proven it can build and field unmanned underwater, aerial, and ground vehicles, Selva noted. Still, he said, there is always a human in the loop—a remotely piloted vehicle still has a human pushing the buttons to fly the vehicle somewhere. "We can actually build autonomous vehicles in every one of those categories," the general said, "and that brings us to the cusp of questions about whether we are willing to have unmanned, autonomous systems that can launch on an enemy."

Selva called this a huge technology question that all people will wrestle with. There are huge ethical implications—implications for the laws of war, and implications that the vice chairman said he calls the "Terminator Conundrum."

"What happens when that 'thing' can inflict mortal harm and is powered by artificial intelligence?" he asked the audience. "How are we going to deal with that? How are we going to know what is in that vehicle's mind?"

These are the problems that must be addressed in the technology sector, Selva said.

Air Force Gen. Paul J. Selva, vice chairman of the Joint Chiefs of Staff, answers a question at the Brookings Institution in Washington, D.C., Jan. 21, 2016. The Center for 21st Century Security and Intelligence hosted the event, which focused on efforts to keep the armed forces at the forefront of innovation.

DoD photo by Army Staff Sgt. Sean K. Harp

O'Hanlon noted that certain sea mines or submunitions are already there. Selva pointed out that the sea mine that detonates when it hears a certain signature still has humans who write the code and tell the mine when it is permitted to detonate.

The Deep Learning Concept

"Deep learning" is a concept that is bandied about in technology companies, and it is also being looked at within the Defense Department, Selva said. "We both have a requirement to sort some of the largest databases in the world," he added.

The intelligence database for the United States is incredibly large, the vice chairman said. "How one might direct an analyst to look at part of that data to make human decisions?" he asked. "If we can build a set of algorithms that allows a machine to learn what's going on in that space and then highlight what is different, it could change the way we predict the weather, it could change the way we plant crops, and it could most certainly change the way we do change-detection in a lethal battlespace. What has changed? What is different? What do we need to address?"

Building these learning algorithms is a place the United States has to go in the future, the vice chairman said. "The data sets we deal with have gotten so large and so complex that if we don't have something to sort them, we're just going to be buried," he said. "The deep learning concept of teaching coherent machines … to advise humans and making them our partners has huge consequences."

MICC Setting Pace in Contract Closeout Priority

MISSION AND INSTALLATION CONTRACTING COMMAND PUBLIC AFFAIRS OFFICE (JAN. 21, 2016)
Daniel P. Elkins

JOINT BASE SAN ANTONIO-FORT SAM HOUSTON, Texas—The implementation of metrics to measure the rate of closing out contracts coupled with holding contracting leaders in the field more accountable for the performance of that contract management step is allowing the Mission and Installation Contracting Command to lead the Army effort.

This data-driven approach has focused MICC contracting officers and contract specialists to make great strides in closing out both current and over-age contracts over the last two fiscal years that not only served to champion the Army Contracting Command effort, but also captured the attention of DoD acquisition officials in helping solve a problem that has plagued the department for years.

"An organization's readiness is tied directly to its fiscal ability to acquire the contracted resources vital in carrying out its operations in support of the warfighter," said Brig. Gen. Jeffrey Gabbert, the MICC commanding general. "Prioritizing contract closeout as an equally essential step in the contract life cycle not only returns funding to our customers for use elsewhere, but also lessens the administrative management that's burdened our offices year after year."

In a 2012 report to the U.S. Senate's Committee on Armed Services on DoD contracting, the development of contract

closeout data and establishment performance measures by the military departments were among the recommendations from the Government Accountability Office to help reduce the backlog of over-age contracts. The audit, GAO-13-131, went on to identify the lack of an implementation plan by the Army following its announcement of a goal to close out more than 475,000 contracts by September 2014.

Annette Logan, a contract specialist at the command headquarters here, serves as the MICC Command Contracting Operations Metrics champion for contract closeouts. Contract closeout is among 18 indicators tracked by metrics that offer a snapshot of the command's execution of fundamental, end-to-end contracting. Implemented across the command in the second quarter of fiscal 2014, she said metric ratings performance is illustrated in red, amber, or green, depending on the percentage of achievement, and shared throughout the organization to drive behaviors.

"We've made considerable progress, because our offices can now see the improvement they're making," said Logan. "However, we still have work to do."

Rick Miller, a procurement analyst at the MICC headquarters, said the command has closed out more than 72,500 current and over-age contracts valued at $27 billion since the start of fiscal 2014. He added that the command had almost 55,000 over-age contracts for which it was responsible to close at the start of fiscal 2014. Contracts are considered over age if they are not closed in accordance with procedures outlined in the Federal Acquisition Regulation. "Since the start of fiscal 2014, the MICC has reduced over-age contracts from 54,953 to 24,022—a reduction of 30,931, or 56 percent," said Miller.

The FAR governs the timelines for closing out contracts. For most simplified acquisitions, contracts are considered closed after the receipt of supplies or services and final payment. Fixed-priced contracts should be closed within six months after completion, and cost-type contracts should be closed within 36 months of the month in which the contracting officer receives evidence of physical completion.

The measure of MICC contract closeouts is captured by a set of two metrics—one tracking contracts that were physically complete before Oct. 1, 2014, and a second, more aggressive metric for those completed on or after that date in order to prevent the sowing of contracts measured by the first metric.

"Contracting offices must achieve a 96-percent closure rate on contracts physically complete after Oct. 1, 2014, in order to meet the metric expectation," Logan said, adding that most of the contracts completed before that date should be closed by the end of this fiscal year based on individual contract closeout plans submitted by the contracting brigades and field directorate office.

In addition to the implementation of metrics, the transfer of contracting office directors in pay plans at the direction of the command leadership placed greater accountability in the performance of meeting those metrics. Directors in the field were moved from the General Schedule pay plan to the DoD Civilian Acquisition Workforce Personnel Demonstration Project, or AcqDemo, pay band in 2015.

"By being held more accountable for their metrics, there is greater incentive to achieve their goals," Logan said.

AcqDemo was developed for the DoD acquisition community to enhance organizational effectiveness through an appraisal process that links contributions to salary. By aligning command metrics with performance objectives under the appraisal process, leaders responsible for the success of their respective contracting operations are encouraged to meet or exceed command expectations.

The increased accountability now tracked by metrics has led to a significant drop in over-age contracts, but that success is also driven by constant communication between the MICC headquarters and field contracting offices. Logan, who has been immersed in this effort for the past two years and took on the job as metric champion this fiscal year, said it has taken a cultural change throughout the organization.

"It's been a challenge to get here," she admitted. "To go from not having to focus on contract closeout as part of your recurring process to now it being placed in the forefront, it has been quite a challenge for some offices, but they are making considerable progress."

She is engaged daily with the contracting support brigades, field directorate office, and installation-level contracting offices, some of which have identified individuals to take on the responsibility of contract closeout at their respective levels. Logan identifies priorities on a list of over-age contracts that require the field's attention that is incorporated into a weekly report.

"The reports allow contracting offices to see where they are at the end of every week," Logan said. "We give them a list of contracts that we're tracking at the headquarters level that need to be closed. As long as they close out what we're tracking, they're doing well."

Pat Hogston, left, and Annette Logan review fiscal 2015 fourth quarter metrics for contract closeout Jan. 21 at Joint Base San Antonio-Fort Sam Houston, Texas. The metrics capture the Mission and Installation Contracting Command's success in accomplishing fundamental acquisition procedures. Hogston is the director of the MICC Contracting Operations Directorate, and Logan is the MICC metric champion for contract closeout.
Photo by Daniel P. Elkins

She added that most offices are headed in the right direction for tracking purposes, but some challenges related to a mix of staffing, workload, and number of over-age contracts remain at a few of the command's 32 contracting offices. Best practices from offices at Fort Drum, New York; Fort Campbell, Kentucky; and Fort Bliss, Texas, have been shared with other offices for possible implementation as an alternate solution.

As metric champion, Logan along with Miller, is sharing the command's approach to success as part of a contract closeout task force established by the Army's deputy assistant secretary for procurement. While the DASA(P) task force meets annually, information and best practices are shared throughout the year with team members that also include stakeholders from the Medical Command, Army Contracting Command, and Army Corps of Engineers.

As the number of over-age contracts are reduced, so too are the fiscal risks of unliquidated obligations for the Army. Pat Hogston, the director of the MICC contracting operations directorate, said this is critical for MICC-supported organizations.

"If unliquidated obligations are not taken care of prior to the funds expiring, then MICC-supported organizations must redirect current-year monies to satisfy those unliquidated obligations," he said.

Hogston added that the closeout of over-age contracts accomplished by the command over the last two years has eliminated approximately $60 million in unliquidated obligations. Funding provided to the Army is closed out on a five-year cycle by the Defense Finance and Accounting Service.

Headquartered on Joint Base San Antonio-Fort Sam Houston, the MICC is made up of more than 1,500 military and civilian members responsible for contracting for soldiers. In fiscal 2015, the command executed more than 36,000 contract actions valued at more than $5.2 billion across the Army, including $2.25 billion to American small businesses. The command also managed more than 600,000 Govern-

ment Purchase Card Program transactions in fiscal 2015 valued at an additional $747 million.

Stratcom Chief Talks Nuclear Deterrence, Modernization

DOD NEWS, DEFENSE MEDIA ACTIVITY (JAN. 22, 2016)
Cheryl Pellerin

WASHINGTON—The global security environment calls for a continued strong nuclear deterrent along with modernization for elements of the nuclear triad and advanced training for U.S. Strategic Command's workforce, the Stratcom commander said here today.

Navy Adm. Cecil D. Haney addressed an audience at the Center for Strategic and International Studies, discussing strategic deterrent forces as a foundation for national security.

Haney said today's security environment is complex, dynamic, and volatile, compounded by asymmetric methods, proliferation of advanced technologies, and provocative and destabilizing behavior by current and potential adversaries. At the same time, he said, while the United States is engaged in a campaign against the Islamic State of Iraq and the Levant and other violent extremists, the behavior on an international stage by Russia, China, North Korea, and Iran warrants U.S. attention.

Russia's Programs

Haney noted Moscow's continued efforts to modernize conventional and strategic military programs, "emphasizing new strategic approaches, declaring and at times demonstrating their ability to escalate ... and conducting destabilizing actions associated with Syria, Ukraine, and Crimea while also violating the Intermediate Nuclear Force Treaty and other international accords and norms."

Russia also is developing counter-space capabilities and conducting malicious activities in cyberspace, the admiral said, noting that Russia claims to be establishing its own cyber command that will conduct offensive cyber activities. Still, Haney said, there is continued progress in the New START treaty, which reduces the number of nuclear weapons and launchers that the United States and Russia deploy.

New START Progress

"By complying with a series of treaties, the United States has reduced its stockpile by 85 percent relative to its Cold War peak," the admiral said. "Instead of dozens of delivery systems, we're well on our way to only four. We are retaining and modernizing only those systems needed to sustain a stable and effective deterrent capability."

Given continued funding and authority, Haney said, "we're on track to achieve New START limits of 1,550 deployed warheads and 700 deployed delivery systems by February 2018."

The treaty, he added, engenders stability by maintaining rough equivalency in size, capability, and transparency through inspections, and it helps to assure non-nuclear nations that they don't need their own nuclear deterrents.

On China, Haney said, "It's not just the build-up of features into larger land masses in the South China Sea, it's also the buildup of their overarching military capabilities to support their anti-access, area denial campaign and quest for sovereignty in the East and South China seas."

China's Military Investments

China continues to make significant military investments in its nuclear and conventional capabilities with a stated goal of defending its sovereignty, he added. For example, China is re-engineering its long-range ballistic missiles to carry multiple nuclear warheads, and it recently conducted a sixth successful test of a hyperglide vehicle.

China also is "parading missiles, clearly displaying their modernization and their capability advancements. China's pursuit of conventional global strike capabilities, offensive counter-space technologies, and exploitation of computer networks raises questions about China's global aspirations," Haney said.

North Korea and Iran

North Korea, with claims of miniaturized warheads, recent claims of a successful hydrogen bomb test, and developments in road-mobile and submarine-launched ballistic missile technologies, shows disrespect for United Nations Security Council mandates and a lack of regard for regional stability, the admiral said. And with Iran, he added, even with the joint comprehensive plan of action, the United States must remain vigilant of any shift in actions regarding nuclear weapon ambitions, ballistic missile programs, and continued involvement in Middle East conflicts.

As a functional combatant command, Haney said, Stratcom has transregional responsibility that extends from under the sea all the way up to geosynchronous orbit.

Six Priorities

Haney listed what he called his six overarching priorities for Strategic Command:
— Deter strategic attack against the United States and provide assurance to allies;

Navy Adm. Cecil D. Haney, commander of U.S. Strategic Command, addresses local media at Malmstrom Air Force Base, Montana, Jan. 14, 2016. During his visit there, Haney had breakfast with airmen and leaders; toured the security forces, missile maintenance, and other facilities; and discussed Stratcom's mission areas and priorities, and Malmstrom's role in deterrence and assurance with Malmstrom personnel. Stratcom has global strategic missions that include strategic deterrence; space operations; cyberspace operations; joint electronic warfare; global strike; missile defense; intelligence, surveillance, and reconnaissance; combating weapons of mass destruction; and analysis and targeting.

U.S. Air Force photo by Airman Collin Schmidt

— Provide a safe, secure, effective, and ready nuclear deterrent force;
— Deliver comprehensive warfighting solutions;
— Address challenges in space and cyberspace;
— Build, sustain, and support partnerships; and
— Anticipate change and confront uncertainty.

"Achieving comprehensive deterrence and assurance requires more than just nuclear weapons systems," the admiral said. It rests on a whole-of-government approach, he explained, and includes having a robust intelligence apparatus; space, cyber, conventional, and missile defense capabilities; global command, control and communications; and comprehensive plans that link organizations and coherently knit their capabilities.

America's Nuclear Deterrent

America's nuclear deterrent, Haney added, is a synthesis of dedicated sensors, assured command and control, a triad of delivery systems, nuclear weapons, enabling infrastructure, trained and ready people and treaties, and nonproliferation activities.

"All remain essential to our national security and continue to provide a stabilizing force in the global geopolitical fabric of the world," he added.

Deterrence also requires a comprehensive understanding and perception of the strategic environment from an adversary's point of view, the admiral noted.

Haney said the command has made great strides in force improvement, readiness tracking, and resource commitments, but most of its delivery systems and the nuclear command, control, and communications architecture must be replaced in the 2025 to 2030 timeframe.

Strategic Stability

"We are fast approaching the point where [failing to modernize these elements] will put at risk our safe, secure, and effective and ready nuclear deterrent, potentially jeopardizing strategic stability," he said.

The budget has a deterrent value of its own and reflects the nation's commitment to its deterrent strategy, he added. "If we are to meet future challenges, we must have a synchronized campaign of investment supporting the full range of military operations that secure our national security objectives across the globe," Haney said.

In the same way that Stratcom sustains and modernizes its platforms and weapons, the admiral said, the command also must sustain and modernize its workforce.

Future Force

"We must invest in the future of the professionals, both civilian and military, who operate, maintain, secure, engineer, and support our nuclear enterprise," he said, adding that Strategic Command is working in this area.

"For example, we've established an academic alliance program focused on developing a community of interest of deterrence and assurance in the context of national security," the admiral said.

Stratcom is partnered with 20 universities and military higher education institutes, including Stanford University, Georgetown University, National Defense University, and several Nebraska universities, he said.

"Tomorrow, we will kick off the third 13-week fellowship program at the University of Nebraska-Omaha, aimed specifically at providing professional growth opportunities for my civilian workforce," Haney explained.

In March, he added, the same university will host an inaugural deterrence and assurance workshop aimed at bringing those professionals together for discussions.

"We must modernize the force, including the people, to ensure this force remains capable of delivering strategic stability and foundational deterrence well into the future, even as we pursue third-offset strategic choices," Haney said.

The Defense Department's "Third Offset Strategy" builds on work done in the 1950s and 1970s to ensure the United States and its allies maintain their technological edge over potential adversaries.